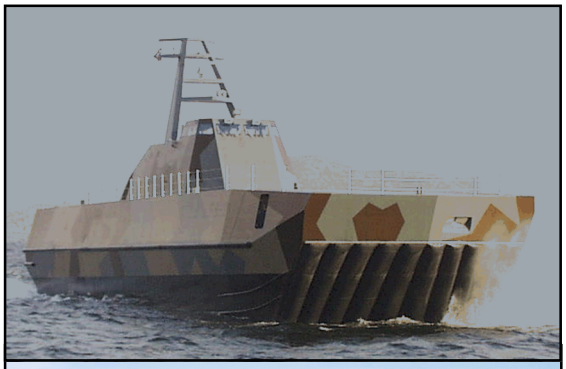
HIGH PERFORMANCE STRUCTURAL SENSORS



	High-Performance NRL Fiber Sensor	*Typical NRL Fiber Sensor*	*Conventional Resistance Strain Gage Sensor*
Resolution (με)			
Dynamic	**~0.001**	*0.1*	*10–100*
Static	**1**	*1*	*10–100*
Dynamic range (dB)	**114**	*94*	*~74*
Bandwidth (Hz)	**~0-20,000**	*~0–360*	*Variable*
Multiplexing ability	**Excellent**	*Excellent*	*Poor*
Drift compensation	**Yes**	*Yes*	*Sometimes*

The Naval Research Laboratory has developed a new, high-performance structural monitoring system based on interrogation of fiber optic Bragg grating sensors. The system uses a scanning Fabry-Perot filter for demultiplexing, a Mach-Zehnder interferometer for high-resolution grating interrogation, and a unique, all-passive algorithm to interrogate a 3×3 coupler at the interferometer output for strain conversion. The system is capable of demultiplexing an array of Bragg grating sensors with the following performance characteristics:

- 10^{-9} strain resolution (~1-cm gage length)
- Frequency bandwidth from DC to several kilohertz
- Temperature compensation
- 114 dB dynamic range
- High multiplexibility

The system is ideally suited for use on a wide variety of structural platforms, including:

- Civil structures (bridges, buildings, dams)
- Aircraft and hydrocraft platforms
- Space vehicles
- Industrial equipment

The high quality data obtained from these systems has supported a number of structural applications, such as:

- Structural health monitoring
- Structural performance charting
- Usage statistics
- Loading history
- Adaptive structure development

Licenses are available to companies with commercial interest.

Point of Contact

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